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Taxonomic studies on *Ustilaginomycetes* – 29

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Abstract — New species described: *Antherospora eucomis*, *Entyloma eryngii-alpini*, *Farysia globispora*, *F. longispora*, *F. microspora*, *Macalpinomyces loudetiopsidis*, *Moreaua capillaceae*, *Mo. eximiae*, *Mo. peckii*, *Mo. tothii*, *Sporisorium schizachyrii-sanguinei*, *Urocystis pulsatillae-albae*, *Ur. vulpiae*, *Ustilago piptatheri*. New name: *Sporisorium sydowiorum*. New combinations: *Heterodoassansia downingiae*, *Microbotryum moelleri*, *Tolyposporium solidum*. Excluded from the smut fungi are: *Entyloma cyperi* and *Ustilago dactylicola*. Keys are given to the species of *Antherospora*, *Entyloma* on *Eryngium*, *Moreaua* on *Schoenus* and *Tetraria*, *Sporisorium* on *Setaria* and *Schizachyrium sanguineum*, *Urocystis* on *Ranunculus* and *Pulsatilla*, and to smut fungi of *Loudetia*, *Loudetiopsis*, *Trichopteryx*, *Tristachya*, and *Zonotriche*.

Key words — *Anthracoideaceae*, *Floromycetaceae*, taxonomy

New species

Three new *Farysia* species from Australasia

The genus *Farysia* Racib. is characterised by sori produced in single flowers of *Cyperaceae* (*Carex*, *Uncinia*); the spore masses are traversed by numerous, conspicuous, capillitium-like fascicles of sterile hyphae. The spores, which are produced in chains by division of the sporogenous hyphae, are single, while sterile cells are absent. About 17 species are recognised. Species delimitation, based on spore morphology, is difficult because of variability in shape and size of spores within a sorus. A critical revision of the genus, with modern molecular methods, is badly needed. However, a comparison of the type specimens shows more or less marked differences. Some collections of *Farysia* on *Carex* species from Australia and New Zealand differ from earlier known species and are described as new.

Farysia globispora Vánky & R.G. Shivas, **sp. nov.**

MycoBank MB 513203

Typus in matrice Carex appressa, *Australia, New South Wales, cca. 6 km SE oppid. Woodenbong, North Yabbra Road, 28°25' S, 152°39' E, 29.XII.1981, leg. K.L. Wilson 4144.* ***Holotypus*** *HUV 19507! (ex NSW); isotypus DAR 75353.*

Sori in nonnullis floribus inflorescentiae, primum in utriculis formati, deinde prorumpentes, globoidei, diametro 1.5–2 mm, massa sporarum atro-olivaceobrunnea, primum agglutinata deinde pulverea, cum fasciculis tenuibus filamentorum sterilium fungalium mixta. Sporae globosae, subglobosae, raro late ellipsoidales, (5–)5.5–9.5 × (5–)5.5–11(–12) µm, pallide olivaceobrunneae; pariete aequaliter 1–2 µm crasso, verrucoso, verrucis interdum in seriebus ordinatis, imago obliqua sporarum sinuata usque leniter serrulata.

Sori (Fig. 1) in some flowers of an inflorescence, formed within the utricles, later bursting, globoid, 1.5–2 mm in diam., spore mass dark olivaceous brown, first agglutinated later powdery, mixed with thin fascicles of sterile fungal filaments. Spores (Figs. 4, 5) globose, subglobose, rarely broadly ellipsoidal, (5–)5.5–9.5 × (5–)5.5–11(–12) µm, pale olivaceous brown; wall evenly 1–2 µm thick, verrucose, warts sometimes arranged in rows, spore profile wavy to finely serrulate.

Fig. 1. Sori of *Farysia globispora* in some flowers (utricles) of *Carex appressa* (type).
Fig. 2. Sori of *Farysia longispora* (type) in some flowers of *Carex dipsacea*.
Bars = 1 cm for habit; 1 mm for detail.

On *Cyperaceae: Carex,* subgen. *Vignea,* sect. *Paniculatae, C. appressa* R. Br.; Australia. Known only from the type collection.

Typical for *Farysia globispora* are the relatively uniform, mostly globose spores.

Farysia longispora Vánky & McKenzie, **sp. nov.**

MycoBank MB 513204

Typus in matrice Carex dipsacea, *New Zealand, North Island, Auckland, Helensville, I.1924, leg. E.H. Atkinson.* ***Holotypus*** *PDD 1283, isotypus HUV 18754!*

Sori in nonnullis floribus inflorescentiae, cylindracei, cca. 1.5 × 2.5–3 mm, peridio tenello, cinereo cooperti, quo rupto irregulariter massam sporarum atro-olivaceobrunneam, semiagglutinatam usque pulveream cum fasciculis longis filamentorum funga lium sterilium mixtam ostendentes. Sporae breviter usque longe ellipsoidales, elongatae, raro subglobosae, ovoideae vel parum flexae, "boumerang-formes", 4–5(–5.5) × 4.5–13(–16) µm, pallide olivaceobrunneae; pariete aequaliter cca. 0.5 µm crasso, dense, irregulariter verrucoso, imago obliqua sporarum leniter sinuata.

Sori (Fig. 2) in some flowers of an inflorescence, cylindrical, c. 1.5 × 2.5–3 mm., first covered by a thin, grey peridium which ruptures irregularly disclosing the dark olivaceous brown, semiagglutinated to powdery mass of spores mixed with long fascicles of sterile fungal filaments. Spores (Figs. 6, 7) short to long ellipsoidal, elongated, rarely subglobose, ovoid or slightly bent, boomerang-shaped, 4–5(–5.5) × 4.5–13(–16) µm, pale olivaceous brown; wall evenly c. 0.5 µm thick, densely, irregularly verrucose, spore profile finely wavy.

On *Cyperaceae: Carex,* subgen. *Carex,* sect. *Echinolaenae, C. dipsacea* Berggr.; New Zealand. Known only from the type collection.

Typical for *Farysia longispora* is the high percentage of elongated spores.

Farysia microspora Vánky & McKenzie, **sp. nov.**

MycoBank MB 513205

Typus in matrice Carex maorica, *New Zealand, North Island, Wellington, Trentham, 25.III.1953, leg. A.J. Healy.* ***Holotypus*** *PDD 12100, isotypus HUV 19059. Paratypus in matrice* Carex fascicularis, *New Zealand, North Island, Auckland, Bethells Swamp, XI.1955, leg. J.M. Dingley, PDD 15571, isoparatypus HUV 18751!*

Sori in floribus nonnullis inflorescentiae, massa sporarum olivaceobrunnea, pulverea, cum fasciculis longis, numerosis filamentorum fungalium sterilium mixta. Sporae globosae, subglobosae, ovoideae, ellipsoidales, raro elongatae, 3–5.5 × 3–7(–7.5) µm, pallide olivaceobrunneae; pariete aequaliter 1–1.5 µm crasso, leniter dense irregulariter verruculoso, verrucis interdum in seriebus brevibus ordinatis, imago obliqua sporarum sinuata usque leniter serrulata.

Sori (Fig. 3) in some flowers of an inflorescence, spore mass olivaceous brown, powdery, mixed with numerous long fascicles of sterile fungal filaments. Spores (Figs. 8, 9) globose, subglobose, ovoid, ellipsoidal, rarely elongated, 3–5.5 × 3–7(–7.5) µm, pale olivaceous brown; wall evenly 1–1.5 µm thick, finely, densely, irregularly verruculose, warts rarely in short rows, spore profile wavy to finely serrulate.

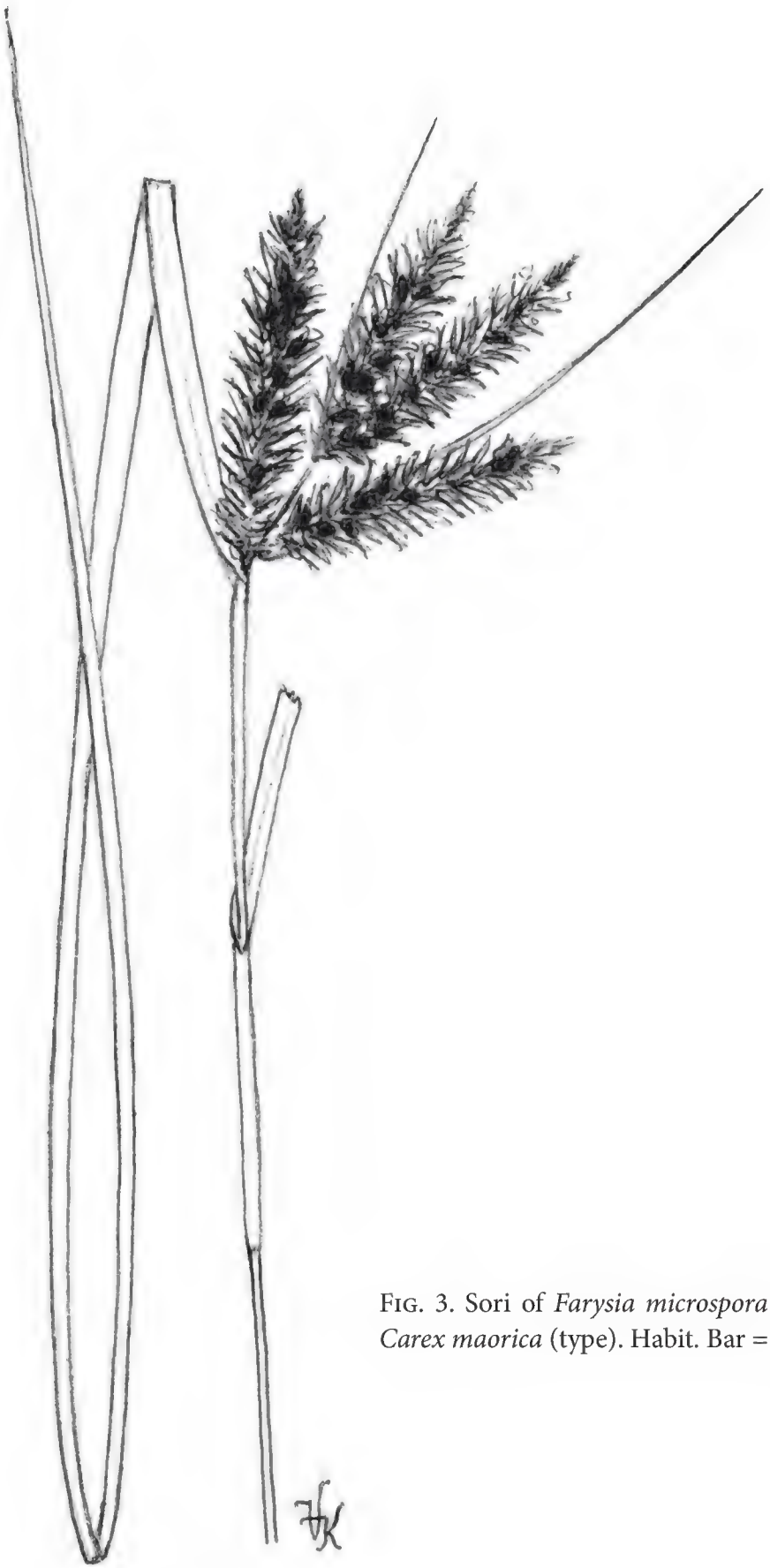

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FIG. 3. Sori of *Farysia microspora* in some flowers of *Carex maorica* (type). Habit. Bar = 1 cm.

On *Cyperaceae: Carex,* subgen. *Carex,* sect. *Pseudocypereae, C. fascicularis* Boott, *C. maorica* Hamlin; New Zealand. Known only from the type collections.

Typical for *Farysia microspora* is the relatively small size of the variable spores.

A new species of *Antherospora* (*Floromycetaceae*) on *Eucomis*

For *Ustilago* species on *Liliaceae* s. l., Ershad (2000: 66) proposed the genus *Vankya,* with three species: 1. *V. ornithogali* (J.C. Schmidt & Kunze) Ershad (on *Gagea* and *Ornithogalum*), 2. *V. heufleri* (Fuckel) Ershad (on *Erythronium* and *Tulipa*), and 3. *V. vaillantii* (Tul. & C. Tul.) Ershad, on several host plant genera. Ultrastructural and molecular analyses revealed that *V. vaillantii* is generically different from the other two species of *Vankya*. For it the genus *Antherospora* R. Bauer et al. (Bauer et al. 2008) was proposed, with the type *A. vaillantii* (Tul. & C. Tul.) R. Bauer et al., on *Muscari comosum* (L.) Mill. A further six species were placed in this genus, all on members of *Hyacinthaceae* (*Liliaceae* s. l.). An additional new species is:

Antherospora eucomis Vánky, **sp. nov.**

MycoBank MB 513206

Typus in matrice Eucomis punctata, *South Africa, Cape Prov., Kentani Distr., Kentani, 12.XII.1914, leg. A. Pegler.* ***Holotypus*** *HUV 18257!; isotypus PREM 8795. Paratypus ibidem, 12.XII.1911, A. Pegler, PREM 2001, isoparatypus BPI 169328!*

Sori in antheris et ad superficiem organorum floralium interiorum, flores massa sporum nigrescentibrunnea, pulverea implentes, involucris floralibus externis cooperti. Sporae globosae, subglobosae, ovoideae, ellipsoidales, elongatae vel parum irregulares, 5.5–8(–9) × 7–12(–13.5) µm, flavidobrunneae; pariete aequali, cca. 0.5 µm crasso, leniter, dense verruculoso, imago oblique sporarum leniter aspera.

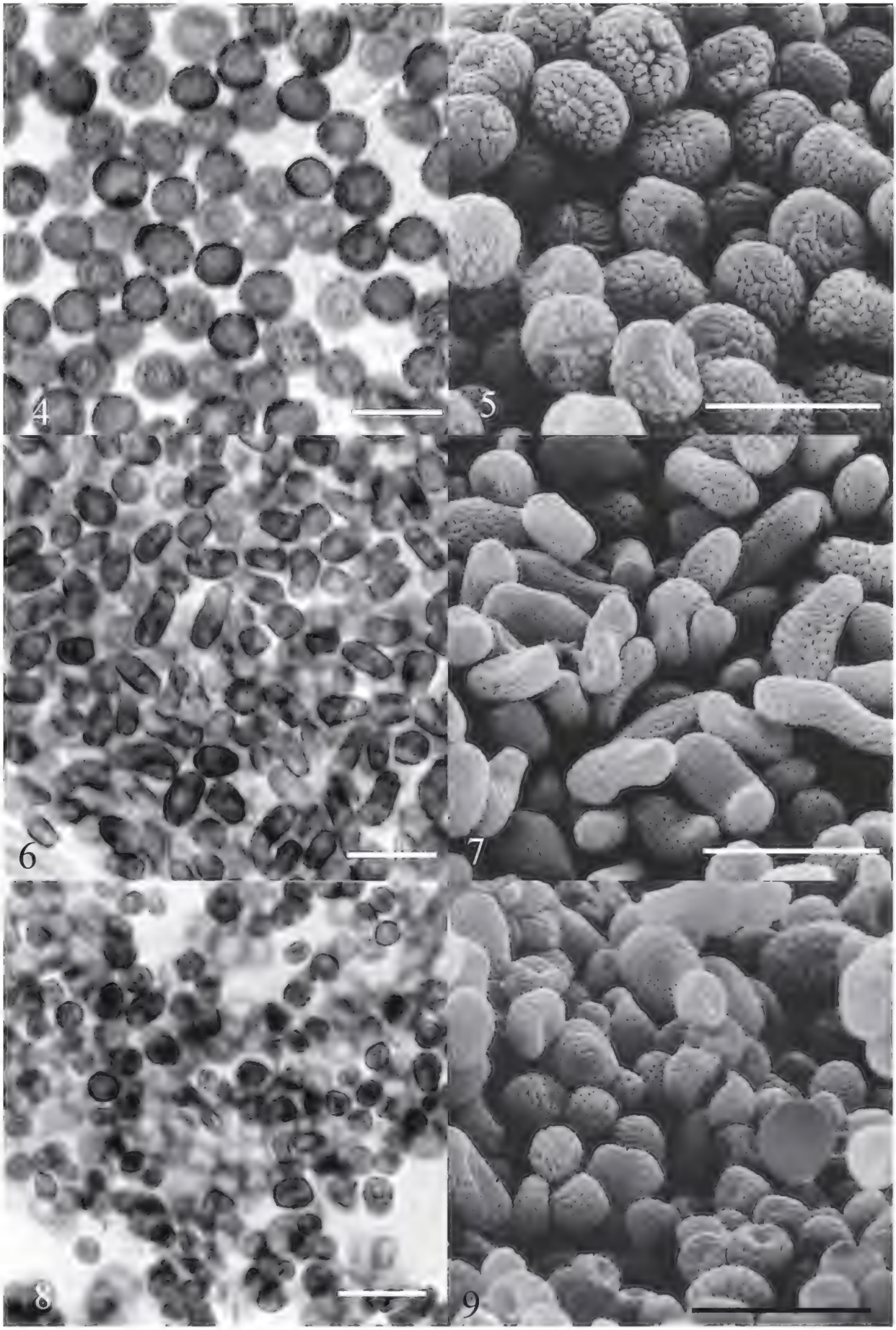
Sori (Fig. 10) in the anthers and on the surface of inner floral organs, filling the swollen, deformed flowers with a blackish brown, powdery mass of spores, covered by the outer floral envelopes. Spores (Figs. 14, 15) globose, subglobose, ovoid, ellipsoidal, elongated or slightly irregular, 5.5–8(–9) × 7–12(–13.5) µm, yellowish brown; wall even, c. 0.5 µm thick, finely, densely verruculose, spore profile finely rough.

On *Hyacinthaceae* (*Liliaceae* s. l.): *Eucomis punctata* (Thunb.) L'Hér.; South Africa.

Typical for *Antherospora eucomis* are the relatively regular, small spores formed in swollen, deformed flowers.

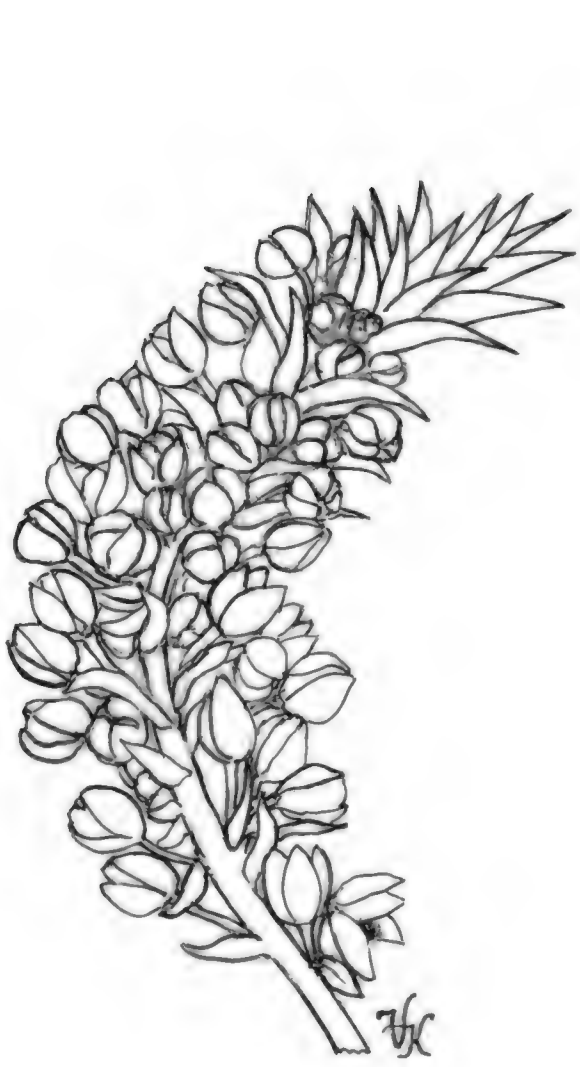
Key to the species of *Antherospora*

1. Sori mainly in the anthers; flowers not or only slightly deformed 2
– Sori in all inner floral organs; flowers deformed, swollen 5
2. On *Muscari*. Spores 6.5–12(–14) µm long ..... ***A. vaillantii***
– Not on *Muscari* 3



Figs.4–9. Spores in LM (left) and SEM (right). Bars = 10 μm. Figs. 4–5. *Farysia globispora* on *Carex appressa* (type). Figs. 6–7. *Farysia longispora* on *Carex dipsacea* (type). Figs. 8–9. *Farysia microspora* on *Carex maorica* (type).

3. On *Ornithogalum*. Spores 9–24(–27) µm long; spore wall c. 0.5 µm thick ..... ***A. peglerae***
– On *Scilla*. Spores 7–11.5(–13) µm long; spore wall 0.8–1.5 µm thick 4
4. On *S. bifolia* ..... ***A. scillae***
– On *S. vindobonensis* (a cryptic species) ..... ***A. vindobonensis***
5(1). Spores 9.5–22.5 µm long. On *Albuca* ..... ***A. albucae***
– Spores smaller. Not on *Albuca* 6
6. Spores regular, 7–12(–13.5) µm long. On *Eucomis* ..... ***A. eucomis***
– Spores more or less irregular, up to 15(–17.5) µm long. Not on *Eucomis* 7
7. Spore wall 0.5–0.8 µm thick. On *Urginea* ..... ***A. urgineae***
– Spore wall c. 0.5 µm thick. On *Bellevalia* ..... ***A. tourneuxii***



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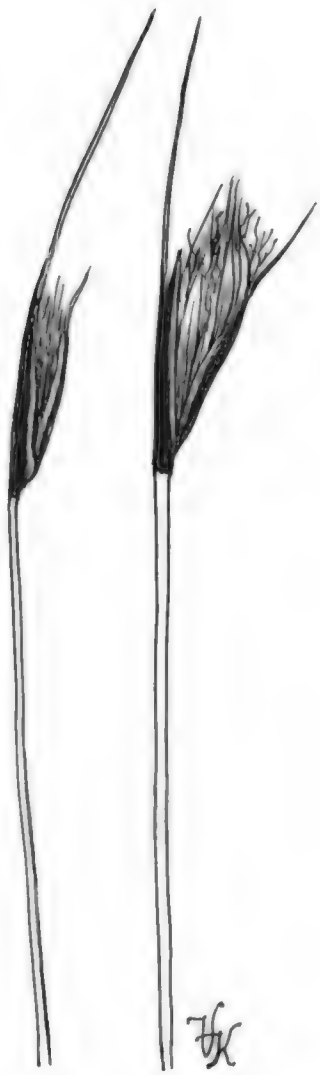

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Fig. 10. Sori of *Antherospora eucomis* in all flowers of *Eucomis punctata* (type).
Fig. 11. Sori of *Moreaua peckii* in the flowers of *Schoenus cruentus* (type).
Habit. To the left a healthy inflorescence. Bars = 1 cm

Four new species of *Moreaua* (*Anthracoideaceae*)

The genus *Moreaua* Liou & H.C. Cheng, within the *Anthracoideaceae* family, has 31 known species, parasitising plants in 17 genera of *Cyperaceae*. On *Schoenus* three species of *Moreaua* are known: 1. *M. kochiana* (Gäum.) Vánky 2000 (type on *S. nigricans* L. × *S. ferrugineus* L., Switzerland), 2. *M. laevigata* (Websdane & Vánky) Vánky 2000 (type on *S. laevigatus* W. Fritzg., Australia), and 3. *M. schoeni* (Vánky & McKenzie) Vánky 2000 (type on *S. brevifolius* R. Br., New Zealand). An additional species was discovered in the mycological herbarium PERTH, incorrectly determined by the unknown collector as *Sorosporium solidum* (Berk.) McAlpine 1910. It is described as:

Moreaua peckii Vánky & R.G. Shivas, **sp. nov.**

MycoBank MB 513207

Typus in matrice Schoenus cruentus, *Australia, Western Australia, Albany, 35°02'53" S, 117°53'47" E, 14.III.1955.* ***Holotypus*** *PERTH 780278, isotypi BRIP 49111, HUV 17587!*

Sori ad superficiem organorum floralium internarum massam nigram glomerulorum sporarum primum agglutinatam serius granulosopulveream perfecte tegenter involucris floralibus maxime externis formantes. Glomeruli sporarum globosi, subglobosi, ovoidei, ellipsoidales, elongati vel parum irregulares, magnitudine variabiliter, 40–80 × 50–100 (–120) µm, rubrobrunnei usque subopaci, e pluries decem sporarum pressu satis faciliter separabilium compositi. Sporae in visu superficiali rotundae vel elongatae, subpolyangulariter irregulares, 7–11 × 8–16 µm, in visu opticaliter mediano subcuneiformes, raro cuneiformes, elongatae vel parum irregulares, 16–28(–32) µm longae, flavidae vel olivaceobrunneae; pariete inaequali, in superficie libera 4–9 µm crasso, leniter verruculoso et squamis irregularibus, pressu devenientibus velato, in latere contacto cca. 0.5 µm crasso, levi, pariete partis centralis, angustis ultimis sporarum 0.5–4 µm crasso, levi.

Etymology: named in honour of the eminent American mycologist Charles Horton Peck (1833–1917), who described more than 2700 new species and varieties of North American fungi. Peck was also an excellent illustrator.

Sori (Fig. 11) on the surface of inner floral organs forming a black, first agglutinated, later granular powdery mass of spore balls, completely hidden by the outermost floral envelopes. Spore balls (Figs. 16, 17) globose, subglobose, ovoid, ellipsoidal, elongate to slightly irregular, variable in size, 40–80 × 50–100 (–120) µm, reddish brown to subopaque, composed of dozens of spores that separate rather easily by pressure. Spores (Figs. 16, 17) in surface view rounded or elongated, subpolyangularly irregular, 7–11 × 8–16 µm, in optical median view subcuneiform, rarely cuneiform, elongated or slightly irregular, 16–28(–32) µm long, yellowish or olivaceous brown; wall uneven, on the free surface 4–9 µm thick, finely verruculose and covered by irregular squamae that detach by pressure, on the contact sides c. 0.5 µm thick, smooth, wall of the central, narrow end of the spores 0.5–4 µm thick, smooth.

On *Cyperaceae: Schoenus cruentus* (Nees) Benth.; Australia. Known only from the type collection.

Key to the species of *Moreaua* on *Schoenus*

1. Spore balls separate by pressure; free spore wall 4–9 µm thick ..... ***M. peckii***
– Spore balls firmly agglutinated; free spore wall thinner 2
2. Spore balls 60–120(–150) µm long; spores radially 12–30(–35) µm ***M. schoeni***
– Spore balls up to 85 µm long; spores radially shorter 3
3. Spores radially 6.5–18 µm long; free wall 1–3 µm thick, germ pore lacking ..... ***M. kochiana***
– Spores radially 12–25 µm long, free wall 2.5–5 µm thick, germ pore present ..... ***M. laevigata***

On *Tetraria* two species of *Moreaua* are known, both on *T. capillaris* (F. Muell.) J.M. Black, from Australia (comp. Vánky & Shivas 2008): 1. *M. opaca* Vánky 2002 and 2. *M. tetrariae* (Vánky) Vánky 2000. Three additional species were collected in South Africa:

Moreaua capillaceae Vánky, **sp. nov.**

MycoBank MB 513247

Typus in matrice Tetraria capillacea *(det. C. Archer, PRE), South Africa, Western Cape Province, Cape Peninsula, Good Hope Nature Reserve, 34°15'54" S, 18°26'15" E, alt. 100 m.s.m., 14.XII.1996, leg. C. & K. Vánky.* **Holotypus** *HUV 18043!, isotypi in Vánky, Ust. exs. no. 1318.*

Moreaua capillaceae *similis* Moreauae opacae *Vánky (Mycotaxon 81: 371, 2002, typus in matrice* Tetraria capillaris, *Australia), sed differt glomerulis sporarum majoribus (50–150(–180) µm longis) et pariete sporarum tenuiore ad superficiem liberam (1–1.5 (–2.5) µm).*

Sori (Fig. 12) on the surface of inner floral organs forming a black, first agglutinated, later granular powdery mass of spore balls, completely hidden by the outermost floral envelopes. Spore balls (Figs. 18, 19) subglobose, ovoid, ellipsoidal, elongate to irregular, 40–100(–130) × 50–150(–180) µm, opaque, permanent, composed of dozens of spores that break rather than separate by strong pressure. Spores (Figs. 18, 19) in surface view polyangularly or subpolyangularly irregular, 6–12 × 7–15.5 µm, in optical median view subcuneiform, elongate or slightly irregular, radially 9.5–24(–28) µm long, dark olive-brown; wall on the free surface 1–1.5 µm thick, at the angles up to 2.5 µm, verruculose, germ pore lacking, wall on the contact sides c. 0.5 µm thick, smooth.

On *Cyperaceae: Tetraria capillacea* (Thunb.) C.B. Clarke; South Africa. Known only from the type collection.

Moreaua capillaceae is similar to *M. opaca* from which it differs in having larger spore balls and thinner spore wall on the free surface. The spore balls of *M. opaca* are 25–55(–60) µm long and the spore wall on the free surface is 2–4.5 µm thick.

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Moreaua eximiae Vánky, **sp. nov.**

MycoBank MB 513248

Typus in matrice Tetraria eximia *(det. C. Archer, PRE), South Africa, Western Cape Province, Cape Peninsula, Mt. Swartkopberge, 34°12'57" S, 18°24'24" E, alt. 100 m.s.m., 13.XII.1996, leg. C. & K. Vánky.* ***Holotypus*** *HUV 18039!, isotypi in Vánky, Ust. exs. no. 1319.*

Moreaua eximiae *similis* Moreauae opacae *Vánky (Mycotaxon 81: 371, 2002, typus in matrice* Tetraria capillaris, *Australia), sed differt glomerulis sporarum atro-rubrobrunneis, non opacis, sporis radialiter brevioribus (9.5–16.5 µm longis) et pariete sporae ad superficiem liberam glomerulorum tenuiore (1–1.5(–2.5) µm).*

Sori (Fig. 13) on the surface of inner floral organs forming a black, first agglutinated, later granular powdery mass of spore balls, completely hidden by the outermost floral envelopes. Spore balls (Figs. 21, 22) subglobose, ovoid, elongate to irregular, 30–70(–80) × (30–)40–80(–100) µm, dark reddish brown, not opaque, composed of dozens of spores that separate with difficulty by strong pressure. Spores (Figs. 21, 22) globose, subglobose, ovoid, ellipsoidal, subcuneiform, in surface view subcircular, ovoid or subpolyangularly irregular, 5.5–12 × 6–17 µm, radially 9.5–16 µm long, reddish brown; wall on the free surface 1–1.5(–2.5) µm thick, irregularly, sparsely verruculose, germ pore lacking, wall on the contact sides c. 0.5 µm thick, smooth.

On *Cyperaceae: Tetraria eximia* C.B. Clarke; South Africa. Known only from the type collection.

Moreaua eximiae is similar to *M. opaca* from which it differs in having dark reddish brown, non opaque spore balls, spores that are radially shorter and the spore wall on the free surface is thinner. In *M. opaca* the spore balls are opaque, the spores are 9–20(–25) µm long, and the spore wall on the free surface is 2–4.5 µm thick.

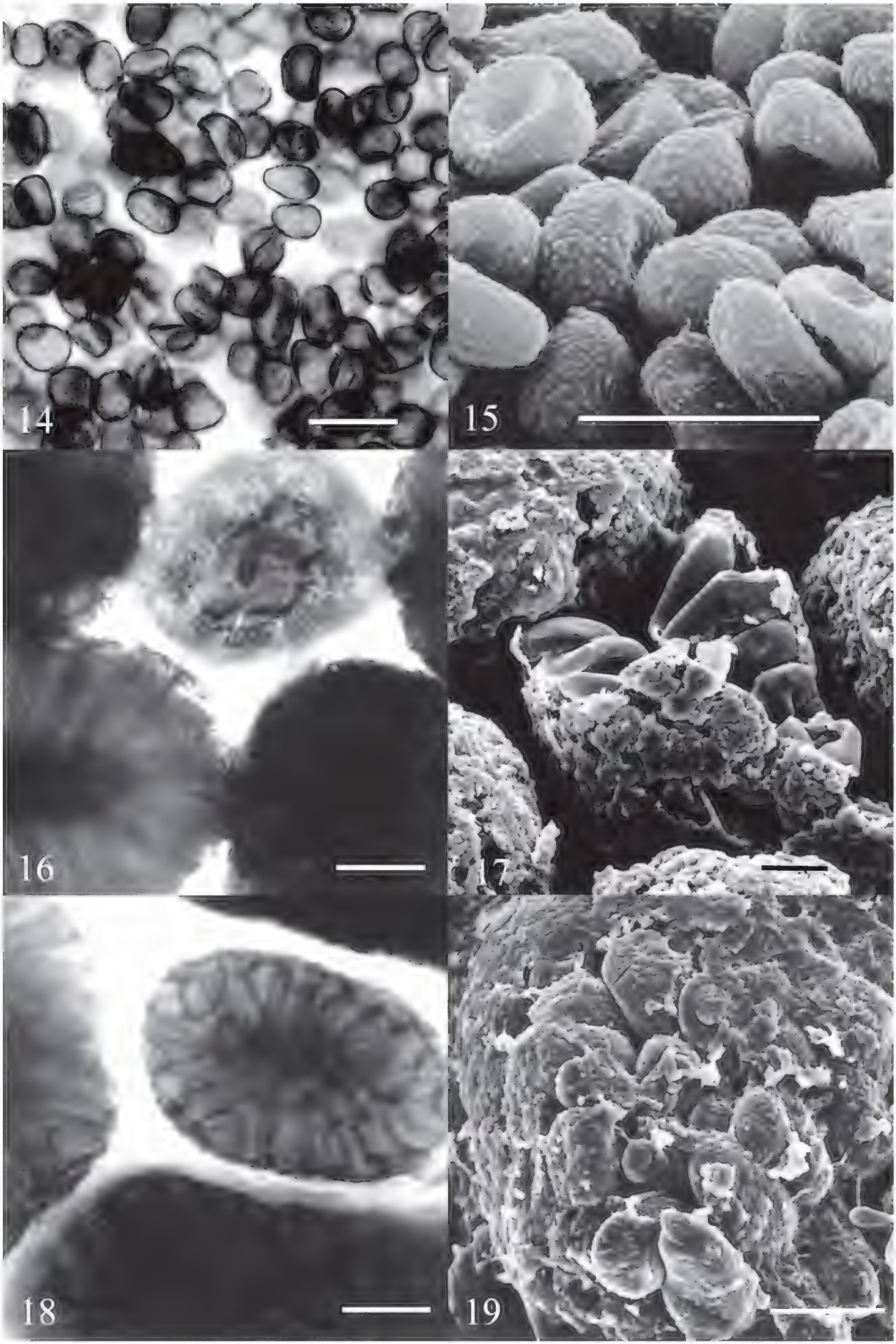
Moreaua tothii Vánky, **sp. nov.**

MycoBank MB 513249

Typus in matrice Tetraria compar *(det. C. Archer, PRE), South Africa, Western Cape Province, Cape Peninsula, Silvermine Nature Reserve, Calc Bay Mt., 34°05'10" S, 18°25'18" E, alt. 300 m.s.m., 12.XII.1996, leg. C. & K. Vánky.* ***Holotypus*** *HUV 18042!, isotypi in Vánky, Ust. exs. no. 1317.*

Moreaua tothii *similis* Moreauae opacae *Vánky (Mycotaxon 81: 371, 2002, typus in matrice* Tetraria capillaris, *Australia), sed differt colore atro-rubrobrunneo glomerulorum sporarum majore (40–130(–160 µm longis) et poro germinationis conspicuo superficiei liberae sporarum externarum glomerulorum.*

Fig. 12. Sori of *Moreaua capillaceae* in the flowers of *Tetraria capillacea* (type). Habit. Fig. 13. Sori of *Moreaua eximiae* in the flowers of *Tetraria eximia* (type). Habit. To the left a healthy inflorescence. Bars= 1 cm.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ETYMOLOGY: named in the honour of the outstanding Hungarian mycologist, Dr. Sándor Tóth (1918–), a modest, unselfish, helpful, excellent human being and friend.

SORI (FIG. 20) on the surface of inner floral organs forming a black, first agglutinated, later granular powdery mass of spore balls, completely hidden by the outermost floral envelopes. SPORE BALLS (FIGS. 23, 24) subglobose, ovoid, ellipsoidal, elongate to irregular, variable in size, 35–90 × 40–130(–160) µm, dark reddish brown to opaque, composed of dozens of spores that separate with difficulty by strong pressure. SPORES (FIGS. 23, 24) in surface view polyangularly irregular, 6.5–12 × 7–15 µm, in optical median view subcuneiform, elongate or slightly irregular, 12–32 µm long, olive-brown; wall on the free surface 1.5–3 µm thick, verruculose and covered by irregular squamae, with a rounded, paler germ pore of 3–4 µm diameter, wall on the contact sides c. 0.5 µm thick, in LM smooth, in SEM very finely verruculose. Spores in the middle of large spore balls are globose, ovoid or ellipsoidal, usually with a 3–4 µm wide, shorter or longer appendage, the remnants of the sporogenous hyphae.

On *Cyperaceae: Tetraria compar* (L.) T. Lestib.; South Africa. Known only from the type collection.

Moreaua tothii is similar to *M. opaca* from which it differs in having dark reddish brown, larger spore balls, and an evident germ pore on the free wall of the outer spores. In *M. opaca* the spore balls are opaque, 25–55(–60) µm long, germ pore is lacking.

Key to the species of *Moreaua* on *Tetraria*

1. Free spore wall with evident germ pore ..... ***M. tothii***
– Free spore wall without germ pore 2
2. Spore balls 25–55(–60) µm long; free spore wall 2–4.5 µm thick ..... ***M. opaca***
– Spore balls larger; free spore wall thinner 3
3. Spores radially 9.5–16.5 µm long. On *T. eximia* ..... ***M. eximiae***
– Spores radially longer. Not on *T. eximia* 4
4. Spore balls opaque, 50–150(–180) µm long; spores radially 9.5–24(–28) µm long. On *T. capillacea* ..... ***M. capillaceae***
– Spore balls dark reddish brown, not opaque, 35–95(–105) µm long; spores radially 10–20 µm long. On *T. capillaris* ..... ***M. tetrariae***

FIGS. 14–19. LM (left) and SEM (right). Bars = 10 µm. FIGS. 14–15. Spores in *Antherospora eucomis* on *Eucomis punctata* (type). FIGS. 16–17. Spore balls and spores of *Moreaua peckii* on *Schoenus cruentus* (type). FIGS. 18–19. Spore balls and spores of *Moreaua capillaceae* on *Tetraria capillacea* (type).

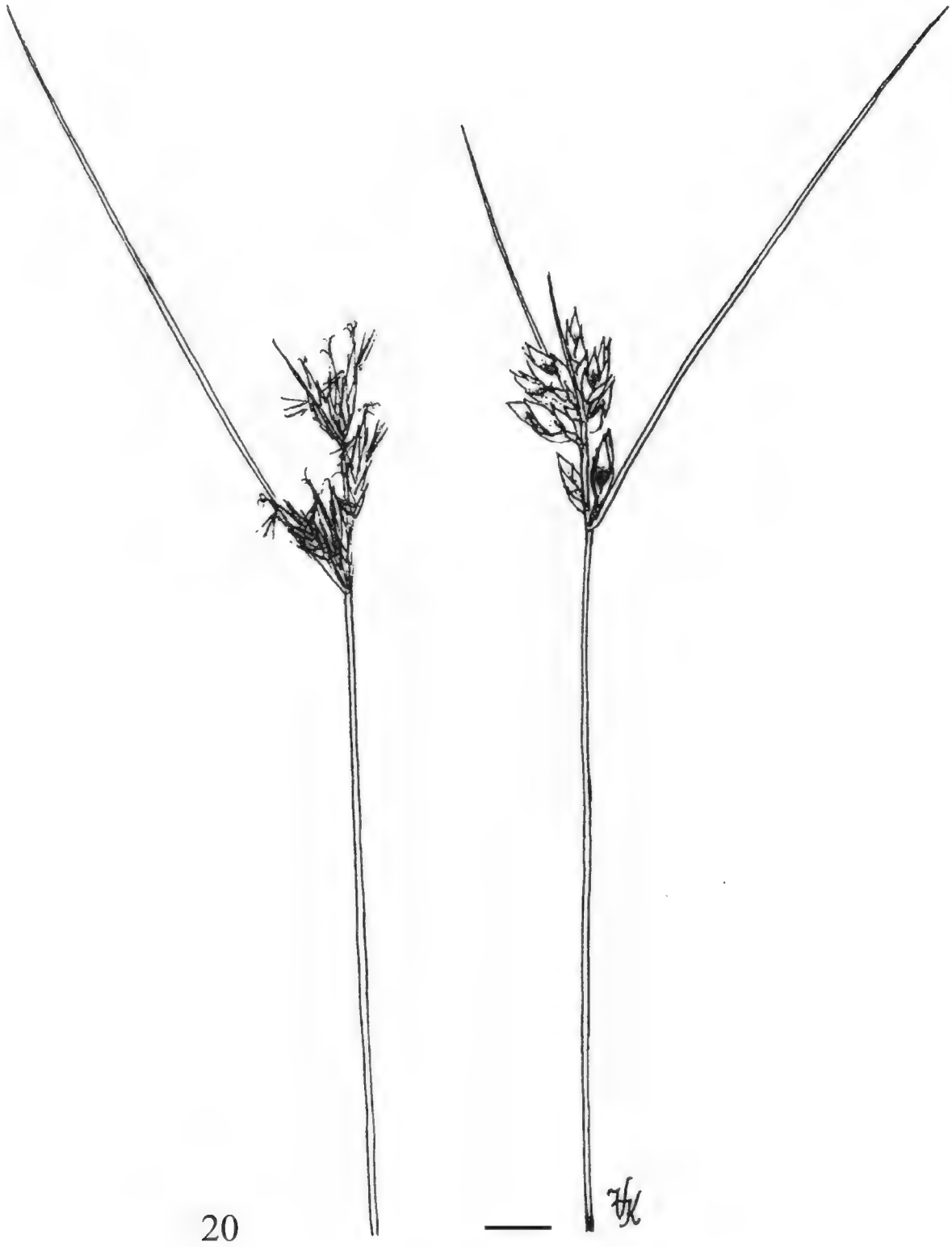
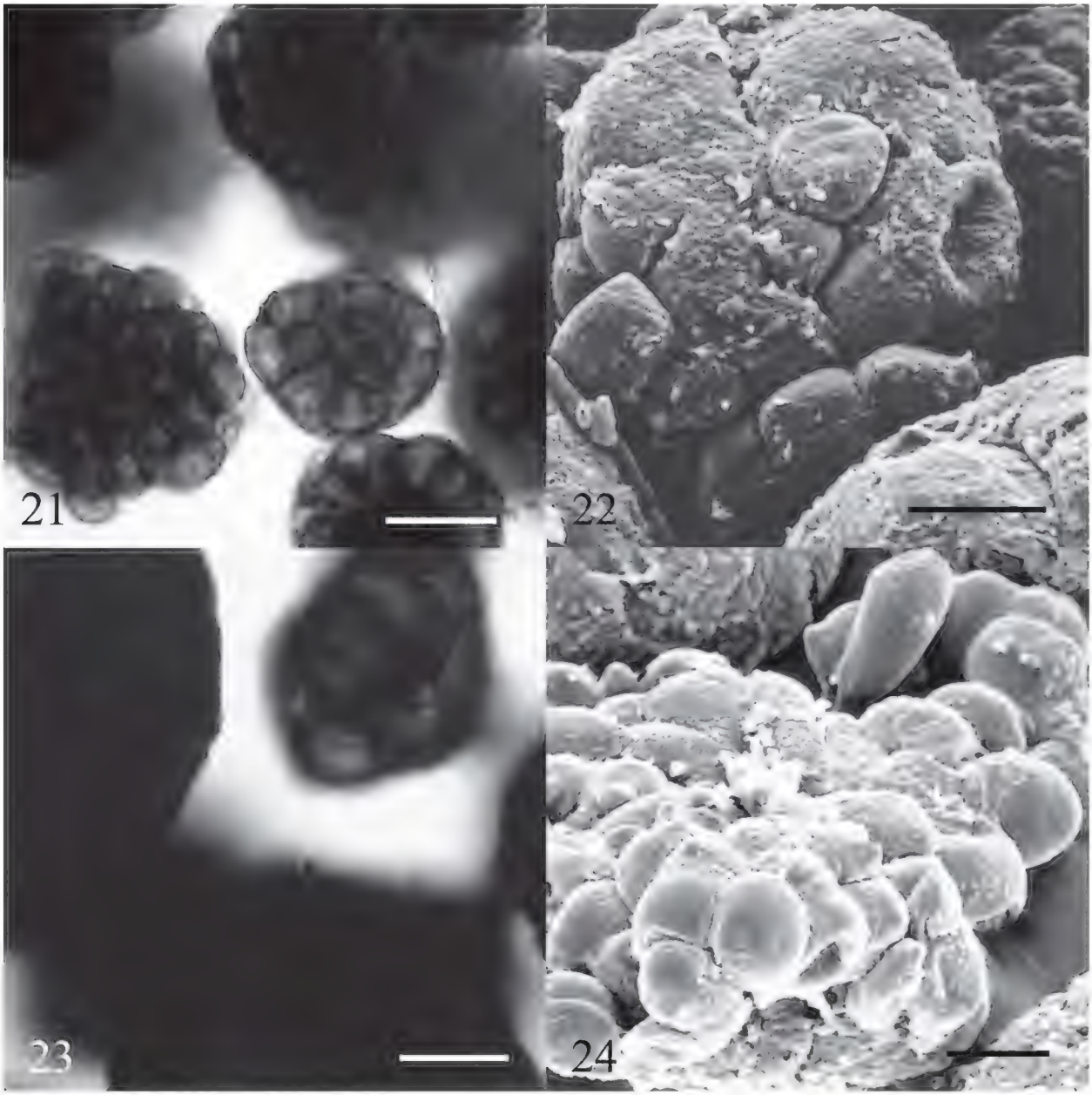


Fig. 20. Sori of *Moreaua tothii* in the flowers of *Tetraria compar* (type). Habit. To the left a healthy inflorescence. Bar = 1 cm.



Figs. 21–24. Spore balls and spores in LM (left) and SEM (right).
Figs. 21–22. *Moreaua eximiae* on *Tetraria eximia* (type).
Figs. 23–24. *Moreaua tothii* on *Tetraria compar* (type).

A new species of *Entyloma* on *Eryngium alpinum* (*Apiaceae*)

A species of *Entyloma* on *Eryngium alpinum* was reported by Servazzi (1950), collected in Italy, Prov. Cuneo, Piedmont, alt. 1600–1700 m., VII.1949. Servazzi supposed that it could be a new species. *E. alpinum* is cultivated in large scale in several places of Switzerland as an ornamental (comp. Rüegg 1990). From such cultures, Adrian Bolay (G, Genève) repeatedly collected heavily infected leaves, attributed to *Entyloma eryngii* (Corda) de Bary 1874. *Entyloma* on *Eryngium alpinum* differs from *E. eryngii* (type on *Eryngium campestre* L.) in sorus and spore morphology. Six *Entyloma* species have been described on various *Eryngium* species with more or less expressed morphological difference of the

spores and sori. It seems that each *Eryngium* species has its own *Entyloma* species. Recent molecular phylogenetic works (Begerow et al. 2002) showed also that in many cases smut fungi, especially *Entyloma* species evolved together with their host plants. Consquently, it seems adequate to consider the smut on *Eryngium alpinum* a separate species:

Entyloma eryngii-alpini Vánky, **sp. nov.**

MycoBank MB 514044

Typus in matrice Eryngium alpinum *cult., Switzerland, Kanton Graubünden, Frauenkirch prope Davos, 46°46'43" N, 9°49'02" E, alt. cca. 1525 m.s.m., 12.VIII.1987, leg. A. Bolay.* ***Holotypus*** *HUV 21598, isotypus in G. Paratypus Kanton Graubünden, Basse Engadine, Ftan, 46°47'50.46" N, 10°15'16" E, alt. 1690 m, 20.VII.1987, leg. A. Bolay, HUV 21597, G.*

Entyloma eryngii-alpini *differt a specie* Entyloma eryngii *(Corda) de Bary (Bot. Zeitung (Berlin) 32: 105, 1874) soris planis, sporis minoribus (8–14 µm longis) et pariete earum tenuiori (1–2.5 µm); atque anamorphae praesenti.*

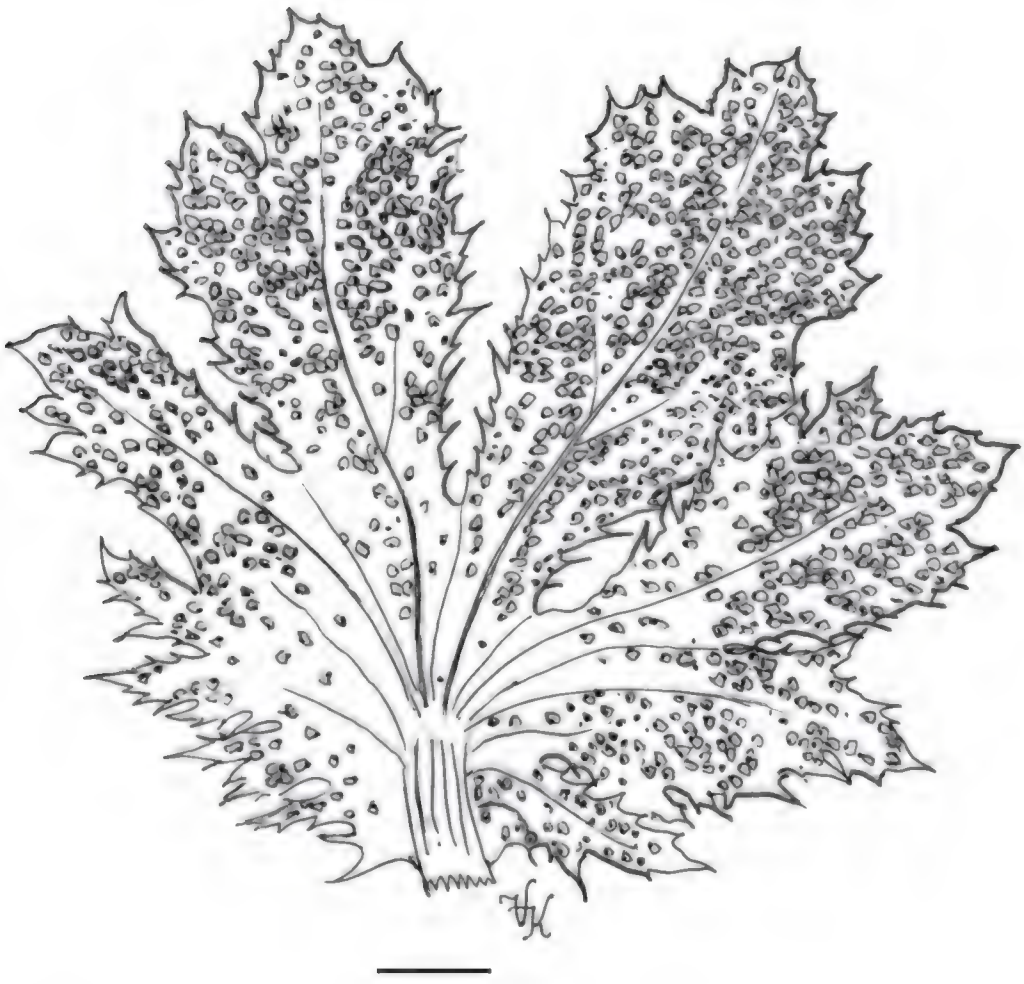


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Fig. 25. Sori of *Entyloma eryngii-alpini* on a leaf of *Eryngium alpinum* (type). Habit. Bar = 1 cm.

Sori (Fig. 25) on the leaves forming initially yellowish white, later browninsh, flat, polyangular spots, 0.5–1 mm in diam. or larger by confluence, delimited by leaf weins, sometimes covering large parts of the leaves. Spores (Fig. 30) embedded in the leaf tissue, crowded, globose, subglobose, ovoid, ellipsoidal or irregular, with one or several slightly flattened sides, 8–13 × 8–14 µm, subhyaline to pale yellowish tinted; wall evenly or unevenly 1–2.5 µm thick, smooth. Anamorph may be present on the abaxial side of the leaves with slightly bent conidia, 2–2.5 × 12–16 µm, protruding from the stomata.

On *Apiaceae: Eryngium alpinum* L.; Europe (Italy, Switzerland).

Entyloma eryngii-alpini differs from *E. eryngii* in having flat sori, smaller spores (8–14 µm long) and thinner spore wall (1–2.5 µm); anamorph present. In *E. eryngii* the sori are often bullate, the spores are 10.5–19 µm long, and the spore wall is 2.5–6(–7.5) µm thick; anamorph absent.

A tentative key to the species of *Entyloma* on *Eryngium*, based mainly on host plant taxonomy

1. On *Er. campestre;* spores 10.5–19 µm long; wall 2.5–6(–7.5) µm thick ***E. eryngii***
– Not on *Er. campestre;* spores smaller; wall thinner 2
2. On *Er. nudicaule;* spores 10–17 µm long; wall 1.5–5 µm thick ... ***E. argentinense***
– Not on *Er. nudicaule;* spores smaller; wall thinner 3
3. On *Er. dichotomum;* spore wall 1.5–3 µm thick. ..... ***E. eryngii-dichotomi***
– Not on *Er. dichotomum;* spore wall thinner 4
4. On *Er. planum;* spore wall even, 1–2.5 µm thick ..... ***E. eryngii-plani***
– Not on *Er. planum;* spore wall even or uneven, thinner or same thickness 5
5. On *Er. maroccanum;* sori thickened; spore wall 0.8–1.5 µm thick ..... ***E. maroccanum***
– Not on *Er. maroccanum;* sori flat; spore wall thicker 6
6. On *Er. alpinum;* wall 1–2.5 µm thick; anamorph present ..... ***E. eryngii-alpini***
– On *Er. tricuspidatum;* wall 1.5–2 µm thick; anamorph absent ..... ***E. eryngii-tricuspidati***

Ustilago piptatheri sp. nov. on *Piptatherum* (*Poaceae*) from Spain

Piptatherum P. Beauv. is a small genus in the tribe *Stipeae* of the subfam. *Pooideae*. It is closely related with *Oryzopsis* Michx. The two genera were also merged by several authors. On members of these two genera the following six smut fungi are known: 1. *Ustilago athenae* Maire 1917 (type on *Oryzopsis miliacea* (L.) Benth. & Hook. f. ex Asch. & Schweinf.) = *Tranzscheliella hypodytes* (Schltdl.) Vánky & McKenzie 2002, 2. *T. minima* (Arthur) Vánky 2003 (type on *Oryzopsis cuspidata* (Nutt.) Benth. ex Vasey), 3. *T. williamsii* (Griffiths) Dingley

& Versluys 1977 (type on *Stipa richardsonii* Link), 4. *Urocystis oryzopsidis* Padwick & A. Khan 1944 (type on *Oryzopsis munroi* Stapf), 5. *Ustilago rechingeri* Săvul. 1937 (type on *Oryzopsis coerulescens* (Desf.) Hack.), and 6. *U. striiformis* (Westend.) Niessl 1876 (type on *Holcus lanatus* L.). An additional name, *Ustilago centrodomis* E. Duval et al. 1975, on *Oryzopsis hymenoides* (Roem. & Schult.) Ricker was invalidly published (no type indicated). On *Piptatherum paradoxum* there is an additional smut fungus, which is described as:

Ustilago piptatheri Vánky, **sp. nov.**

MycoBank MB 514045

Typus in matrice Piptatherum paradoxum, *Spain, Pancorbo, 42°37'27" N, 03°06'31" W, alt. c.c.a. 650 m.s.m., sine date, leg. Sennen et Elias.* ***Holotypus*** *HUV 21590.*

Sori in spiculis omnibus inflorescentiae ejusdem, organa intima floralia et partem basalem involucrorum floralium destruentes, earum vicem massa sporarum nigrobrunnea, pulverea implentes, nonnunquam glumam primam vel etiam secundam intactam relinquentes. Sporae semiglobosae, latere uno impresso, in visu laterali 3.5–5 µm crassae, in visu plano circulares usque ellipticae, 5–6.5 × 5.5–8 µm, flavidobrunneae; pariete inaequali, 0.5–0.8 µm crasso, ad laterem planum tenue, ubi etiam pallidiore, superficie leniter punctata, imago obliqua sporae levis, vel in latere pallido leniter undulata.

Sori (Fig. 26) in all spikelets of an inflorescence destroying the innermost floral organs and the basal part of the floral envelopes, replacing them with a blackish brown, powdery mass of spores, sometimes leaving intact the first or even the second glume. Spores (Figs. 31, 32) hemiglobose, impressed on one side, in side view 3.5–5 µm wide, in plane view circular to elliptic, 5–6.5 × 5.5–8 µm, yellowish brown; wall uneven, 0.5–0.8 µm thick, thin on the flattened side, where the spores are also paler, surface finely punctate, spore profile smooth or very finely wavy on the paler side.

On *Poaceae: Piptatherum paradoxum* (L.) P. Beauv. (*Oryzopsis paradoxa* (L.) Nutt.; Europe. Known only from the type locality.

Ustilago piptatheri is closest to *U. rechingeri,* which completely destroys the spikelets, and has globose or subglobose spores.

Urocystis vulpiae sp. nov. on *Vulpia* (*Poaceae*) from Spain

In HUV there is a collection under the name "*Tuburcinia* sp. on *Ventenata dubia*", obtained from the late Prof. C. Zambettakis (PC, Paris). The host plant is actually *Vulpia alopecuros* (subfam. *Pooideae,* tribe *Poeae*) and its smut is a new species:

Urocystis vulpiae Vánky, **sp. nov.**

MycoBank MB 514046

Typus in matrice Vulpia alopecuros, *Spain, Cádiz, prope urbem Rota, 36°38' N, 06°19' W, alt. cca. 5 m.s.m., 8.V.1969, leg. J. Mercé.* ***Holotypus*** *HUV 21590!*

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FIG. 26. Sori of *Ustilago piptatheri* in all spikelets of an inflorescence of *Piptatherum paradoxum* (type). Habit. To the left a healthy inflorescence. Bar = 1 cm.

Urocystis vulpiae *differt ab* Urocystis agropyri *(Preuss) A.A. Fisch. Waldh. (Bull. Soc. Imp. Naturalistes Moscou 40: 258, 1867, typus in matrice* Elymus repens *(L.) Gould) praecipue numero sporarum in glomerulis sporarum, colore atriore cellularum sterilium et*

FIG. 27. Sori of *Urocystis vulpiae* on leaves and leaf sheaths of *Vulpia alopecuros* (type). Habit. To the left a healthy inflorescence. Bar = 1 cm.

propter genera plantarum nutrientium valde aliena: Vulpia *in* Poeae, Elymus *in* Triticeae (*subfam.* Pooideae).

Sori (Fig. 27) on leaves, leaf sheaths and stems as long, lead-coloured striae between the veins, rarely on floral envelopes of aborted inflorescence as pustules, at first covered by the epidermis that ruptures disclosing the dark brown, powdery mass of spore balls. Spore balls (Figs. 33, 34) globose, ovoid or ellipsoidal, 16–30 × 16–40 µm, medium dark reddish brown, composed of 1–3(–5) spores completely invested by sterile cells. Spores (Figs. 33, 34) globose, ovoid, ellipsoidal or irregular, with one or two flattened sides, 9.5–13.5 × 12–18.5 µm, reddish brown; wall evenly c. 1 µm thick, apparently smooth. Sterile cells (Figs. 33, 34) subglobose, ellipsoidal to slightly irregular, 6.5–15 µm long, reddish brown; wall smooth, unevenly 0.8–1.5 µm thick, thin on the free surface which is impressed in old specimens.

On *Poaceae: Vulpia alopecuros* (Schousb.) Dumort.; Europe. Known only from the type locality.

Urocystis vulpiae differs from *U. agropyri* especially in the number of spores per spore ball, in the darker colour of the sterile cells, and the host plant genera which belong to different tribes, *Vulpia* to *Poeae, Elymus* to *Triticeae* of the subfam. *Pooideae.* The number of spores per spore ball in *U. vulpiae*, counted for 500 balls, is: 1 = 49.4%, 2 = 38%, 3 = 11.8%, 4 = 0.6%, 5 = 0.2%. For *U. agropyri* (on *Elymus repens,* in Vánky, Ust. exs. no. 236) it is: 1 = 74.2%, 2 = 23.8%, 3 = 2%. A closely related smut fungus occurs on *Cynosurus cristatus* L. (tribe *Poeae*; Switzerland, HUV 21612) in which the number of spores per spore ball is similar to that of *U. vulpiae,* the sterile cells are yellowish brown, completely or incompletely surrounding the spores.

A new species of *Urocystis* on *Pulsatilla alba* from the Tatra Mts.

On *Pulsatilla* (*Ranunculaceae*) two *Urocystis* species are known. *U. pulsatillae* (Bubák) Moesz 1950 (type on *P. patens* (L.) Mill., Czech Rep.) and *U. qinghaiensis* L. Guo 2002 (type on *P. chinensis* (Bunge) Regel, China). The collective species *U. sorosporioides* Körn. ex A.A. Fisch. Waldh. (type on *Thalictrum minus* L., Germany) given on *P. styriaca* (Pritz.) Simonk. (= *P. halleri* subsp. *halleri*) from Hungary (Husz 1921: 101), must be an incorrect identification. A different species occurs on *P. alba* in the Tatra Mountains (comp. also Vánky 1994: 303). It is described as:

Urocystis pulsatillae-albae Vánky & Tóth, **sp. nov.**

MycoBank MB 514047

Typus in matrice Pulsatilla alba, *Slovakia, Mt. Vysoké Tatry, in valle Furkotská dolina, 49°09'22" N, 20°01'42" E, alt. cca. 2000 m.s.m., 26.VIII.1979, leg. S. Tóth et K. Vánky.* ***Holotypus*** *HUV 8873!, isotypus in BP. Paratypi in matrice* Pulsatilla alba, *ibidem, VII.1924, leg. J. Hruby, HUV 2954!, et Slovakia, Mt. Bielské Tatry, Faixova lonka, 13.VII.1949, leg. M. Součkova, HUV 6240!*

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Fig. 28. Sori of *Urocystis pulsatillae-albae* on leaves and petioles of *Pulsatilla alba* (type). Habit. To the left a fruiting healthy inflorescence. Bar = 1 cm.

Urocystis pulsatillae-albae *differt a specie* Urocystis pulsatillae *(Bubák) Moesz (A Kárpát-medence üszöggombái, p. 211, 1950) principaliter glomerulis sporarum majoribus (20–52 (–65) µm longis) e sporis 1–7(–8) compositis et a strato cellularum sterilium plus-minus complete circumdatis.*

Sori (Fig. 28) as blister-like swellings on leaves, petioles and stems, often confluent and causing distortions, first covered by the epidermis which ruptures disclosing the black, powdery mass of spore balls. Spore balls (Fig. 35) subglobose, ellipsoidal, elongate or irregular, 16–40 × 20–52(–65) µm, reddish brown, composed of 1–7(–8) spores completely or nearly completely surrounded by sterile cells. Spores (Fig. 35) subglobose, ovoid, ellipsoidal, elongate, usually irregular with one or several flattened sides, 12–17.5 × 14.5–21.5(–24) µm, reddish brown; wall c. 1 µm thick, smooth. Sterile cells (Fig. 35) ellipsoidal, 8–14.5 µm long, yellowish brown; wall uneven, 1–1.5 µm thick on the contact sides, c. 0.5 µm thick on the free surface, smooth, collapsed in old specimens.

On *Ranunculaceae: Pulsatilla alba* Rchb.; Europe (Carpathian Mts.).

Urocystis pulsatillae-albae differs from *U. pulsatillae* especially by larger spore balls composed of more spores and a ± completely surrounding layer of sterile cells. The number of spores per spore ball, counted for 500 balls, is: 1 = 8%, 2 = 31.6%, 3 = 25.2%, 4 = 22%, 5 = 8.8%, 6 = 2.4%, 7 = 1.6%, 8 = 0.4%. In *U. pulsatillae* the spore balls are 16–40 µm long, composed 1–5 spores (1 = 26%, 2 = 42%, 3 = 22.6%, 4 = 7.4%, 5 = 2%) and an incompletely investing layer of sterile cells. *U. pulsatillae-albae* differs also from *U. qinghaiensis,* with spore balls composed of 1–10(–13) spores which are also smaller (10.5–16 µm long). *Pulsatilla alba* can be parasitized also by *U. pulsatillae.*

Key to the species of *Urocystis* on *Pulsatilla*

1. Spores per spore ball 1–5; layer of sterile cells incomplete ..... ***U. pulsatillae***
– Spores per spore ball more; layer of sterile cells ± complete 2
2. Spores per spore ball 1–7(–8); spores 14.5–21.5(–24) µm long ..... ***U. pulsatillae-albae***
– Spores per spore ball 1–10(–13); spores 10.5–16 µm long ..... ***U. qinghaiensis***

Sporisorium schizachyrii-sanguinei sp. nov. from Mexico

On species of *Schizachyrium* and the closely related *Andropogon* (*Poaceae,* subfam. *Panicoideae,* tribe *Andropogoneae,* subtribe *Andropogoninae*) there are 36 known *Sporisorium* species (Vánky, in press). Between smut fungi obtained in exchange from Prof. Ruben Durán (Pullman, USA), there is a collection on *Andropogon hirtiflorus* (Nees) Kunth (= *Schizachyrium sanguineum*) under the name *Sorosporium provinciale*, collected in Mexico. Its study showed that it represents a new species:

FIG. 29. Sori of *Sporisorium schizachyrii-sanguinei* in the racemes of *Schizachyrium sanguineum* (type). Habit. To the left a healthy inflorescence. Bar = 1 cm.

Sporisorium schizachyrii-sanguinei Vánky, **sp. nov.**

MycoBank MB 514048

Typus in matrice Schizachyrium sanguineum, *Mexico, Chiapas, 20.2 km N of junction of Hwys 190 and 195, alt. 1066 m.s.m., 24.XI.1974, leg. R. Durán.* ***Holotypus*** *HUV 14406!, isotypus WSP 68305.*

Sori racemos destruentes, lineares, 2.5–3 cm longi, 0.5–1 mm lati, partim spathis occulti, initio peridio tenui cooperti, quo irregulariter rupto massam nigrobrunneam, granuloso-pulveream glomerulorum sporarum et columellam longam, tenuem, filiformem ostendentes. Glomeruli sporarum subglobosi, ovoidei, ellipsoidales, elongati vel parum irregulares, 35–70 × 40–120 µm, mediocriter atro-rubrobrunnei, e pluribus decem sporarum facile separabilium compositi. Sporae subglobosae, ovoideae, ellipsoidales, elongatae vel irregulares, 9–13.5 × 9.5–16 µm, flavidobrunneae cum areis leviter pallidioribus et atrioribus; pariete inaequaliter 0.5–1.5 µm crasso, subtiliter verruculoso, imago obliqua sporarum levis. Cellulae steriles absentes.

Sori (Fig. 29) destroying the racemes, linear, 2.5–3 cm long, 0.5–1 mm wide, partly hidden by the spathae, initially covered by a thin peridium that ruptures irregularly disclosing the blackish brown, granular-powdery mass of spore balls and a long, slender, filiform columella. Spore balls (Figs. 36, 37) subglobose, ovoid, ellipsoidal, elongate or slightly irregular, 35–70 × 40–120 µm, medium dark reddish brown, composed of tens of spores that separate easily. Spores (Figs. 36, 37) subglobose, ovoid, ellipsoidal, elongate or irregular, 9–13.5 × 9.5–16 µm, yellowish brown with slightly paler and darker areas; wall unevenly 0.5–1.5 µm thick, finely verruculose, spore profile smooth. Sterile cells absent.

On *Poaceae: Schizachyrium sanguineum* (Retz.) Alston (*S. hirtiflorum* Nees); N. America. Known only from the type collection.

Sporisorium schizachyrii-sanguinei differs from *S. provinciale* (Ellis & Galloway) Vánky & Snets. 1990, in which the sori are up to 12 cm long, with several, interwoven columellae, and the spores are 13–19 µm long, with 3–4 µm thick wall. Further smut fungi on *Schizachyrium sanguineum* are: *Sporisorium absconditum* Vánky 2003, *S. andropogonis* (Opiz) Vánky 1985, *S. berndtii* Vánky 2003, *S. guaraniticum* (Speg.) Vánky 1989, and *S. schizachyrii* Vánky 2002.

Key to the *Sporisorium* species of *Schizachyrium sanguineum*

1.	Sterile cells present; columella rather thick	***S. andropogonis***
–	Sterile cells absent; columella filiform	2
2.	Sori in spikelets	3
–	Sori in racemes	4
3.	Sori in all sessile spikelets; columella one; spores dimorphic	***S. schizachyrii***
–	Sori in some sessile spikelets; columellae several; spores not dimorphic	***S. berndtii***
4.	Spore balls persistent; spores dimorphic	***S. absconditum***
–	Spore balls loose; spores not or only slightly dimorphic	5

5. Spores 13–20 µm long; spore wall 2.5–4 µm thick ..... ***S. guaraniticum***
– Spores 9.5–16 µm long; spore wall 0.5–1.5 µm thick .. ***S. schizachyrii-sanguinei***

A new *Macalpinomyces* on *Loudetiopsis* from Bolivia

A study of "*Sporisorium tristachyae*" on *Loudetiopsis chrysothrix* from Bolivia revealed that it represents a new species, which is described as:

Macalpinomyces loudetiopsidis Vánky, **sp. nov.**

MycoBank MB 514061

Typus in matrice Loudetiopsis chrysothrix, *Bolivia, Depto. Santa Cruz, Prov. Samaipata, El Fuerte, cca. 18°10'41.78" S, 63°49'13.16" W, alt. cca. 1905 m.s.m., 30.I.2000, leg. M. Piepenbring et al. 2630,* ***Holotypus*** *LPB!*

Macalpinomyces loudetiopsidis *differt a specie* M. tristachyae *Vánky et C. Vánky (in Vánky, Mycotaxon 65: 165, 1997; typus in matrice* Tristachya leucothrix *Nees, South Africa) sporis majoribus (7–10.5 × 9–14(–15) µm), pallidioribus, cum pariete aequaliter 0.5–0.8 µm crasso, leniter, dense punctato-verruculoso; cellulae steriles 8–17.5 µm longae.*

Sori on the top of sterile shoots, partly enclosed by the uppermost leaf sheath, elongated, tube-shaped, filled by a semiagglutinated to powdery mass of pseudo spore balls, spores and sterile cells. Spore balls (Figs. 38, 39) subglobose, ovoid, ellipsoidal or irregular, 50–100 × 60–140 µm, reddish brown, composed of numerous spores that separate easily. Spores (Figs. 38, 39) rounded subpolyangularly irregular, more rarely elongated and with a subacute tip, 7–10.5 × 9–14(–15) µm, pale yellowish brown; wall evenly 0.5–0.8 µm thick, finely, densely punctuate-verruculose, spore profile smooth. Sterile cells in irregular groups or single, subglobose, ellipsoidal or irregular, with one or several flattened sides, 5–15 × 8–17 µm, subhyaline; wall 0.5–2 µm thick, smooth.

On *Poaceae*: *Loudetiopsis chrysothrix* (Nees) Cornert; South America (Bolivia). Known only from the type collection.

The checked specimen in LPB (La Paz, Bolivia), on which the description of this fungus is based, contained only a healthy inflorescence and spores in the envelope, no sori. Description of sori is taken from the literature. No additional specimens could be detected in the private collection of M. Piepenbring (pers. comm.), or in BPI, FR, M, TUB. This smut was reported by Piepenbring (2002: 54) as *Sporisorium tristachyae* (Vánky & C. Vánky) M. Piepenbr 2002, based on *Macalpinomyces tristachyae*). However, *Macalpinomyces loudetiopsidis* differs

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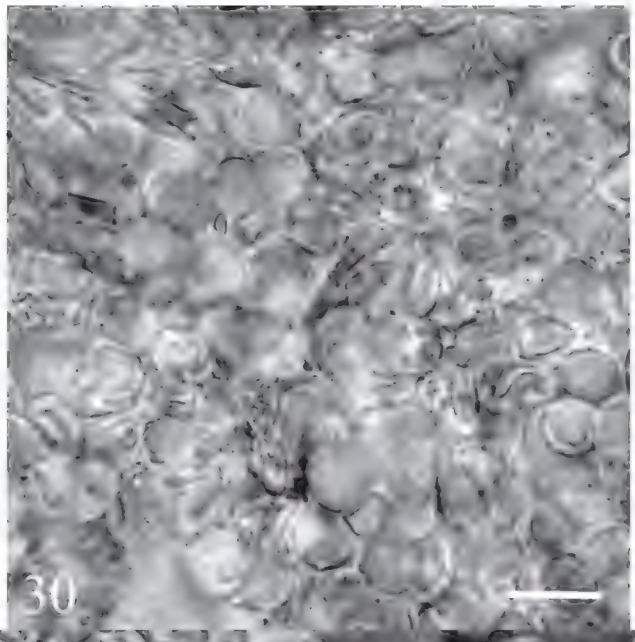
Fig. 30. Spores of *Entyloma eryngii-alpini* on *Eryngium alpinum* in LM (type). Figs. 31–32. Spores of *Ustilago piptatheri* on *Piptatherum paradoxum* in LM and in SEM (type). Figs. 33–34. Spore balls, spores and sterile cells of *Urocystis vulpiae* on *Vulpia alopecuros* in LM and in SEM (type).
Bars = 10 µm.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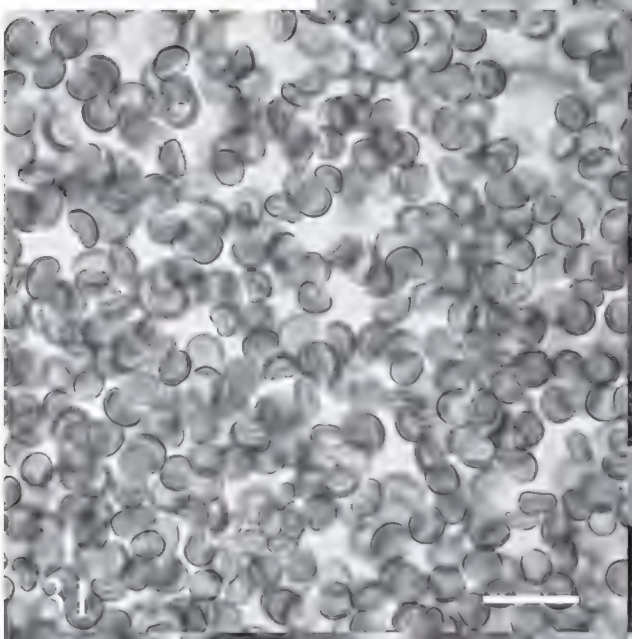
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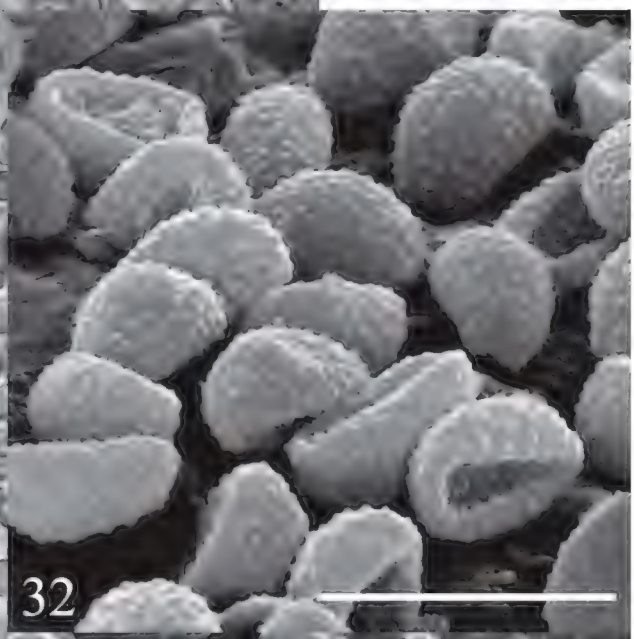
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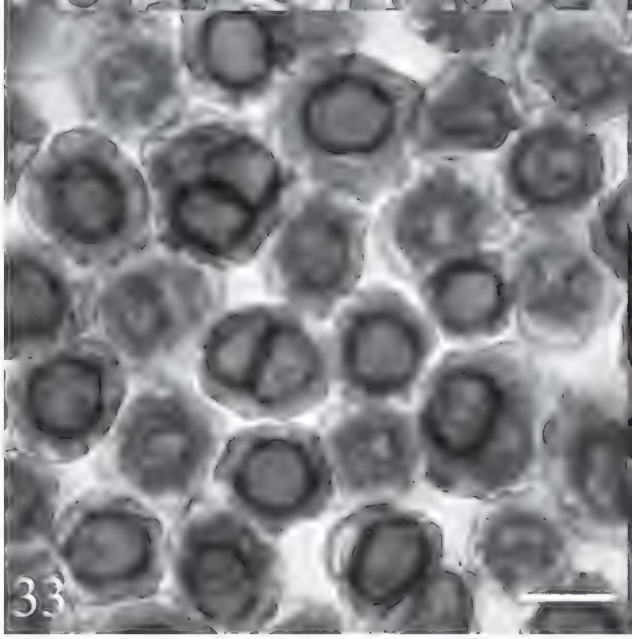
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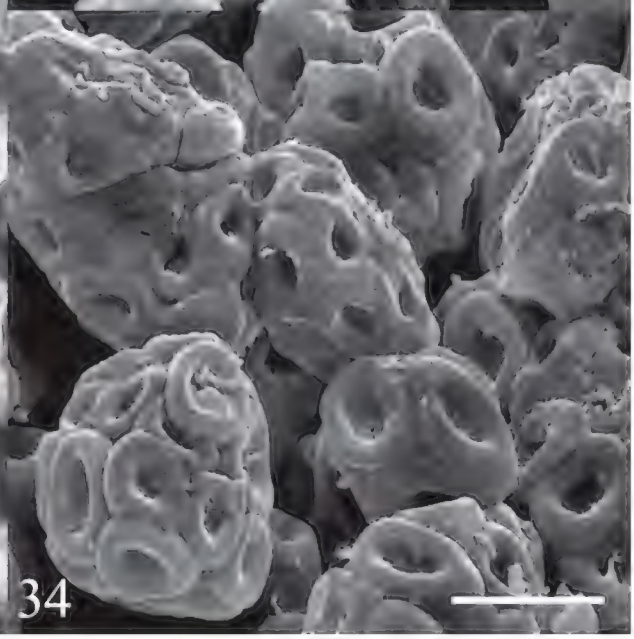
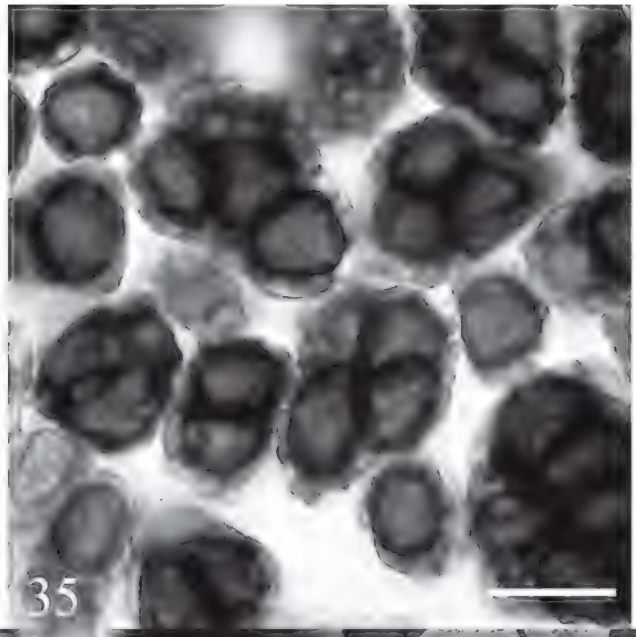

34

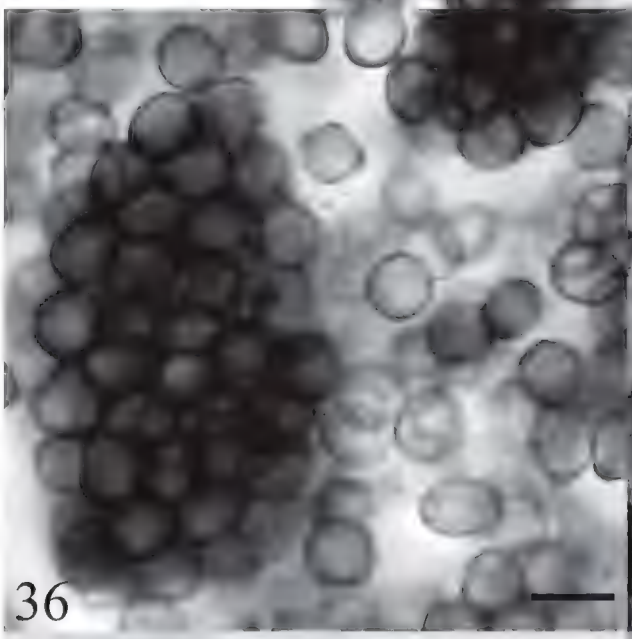
from *M. tristachyae* Vánky & C. Vánky 1997 (type on *Tristachya leucothrix* Nees, South Africa) in having larger, paler spores with evenly thinner wall, and in possessing smaller sterile cells. In *M. tristachyae* the spores are more regular, 7–9 µm long, darker (reddish brown), with unevenly 0.5–1.5 µm thick wall, the sterile cells are 16–35 µm long. In addition, the two species infect host plants belonging to different genera. *M. loudetiopsidis* differs also from *M. simplex* Vánky 2000 (type on *Loudetia simplex*, Zimbabwe), in which the spores are more evidently verruculose, and the sterile cells measure 13–27 × 15–29 µm.

Key to the smut fungi of *Loudetia, Loudetiopsis, Trichopteryx, Tristachya,* and *Zonotriche*

1. Sori in the distal part of the stems as long tubes, later as twisted bands 2
– Sori elsewhere 6
2. Sori up to 100 cm long; spores densely, prominently echinulate ***Mac. ugandensis***
– Sori much shorter; spores finely punctate or verruculose 3
3. Spores 7–9 µm long ..... ***Mac. tristachyae***
– Spores larger 4
4. Spores 8–12 µm long; sterile cells up to 35 µm long ..... ***Mac. trichopterygis***
– Spores 9–15 µm long; sterile cells smaller 5
5. Spores evidently verruculose; sterile cells up to 29 µm long ..... ***Mac. simplex***
– Spores finely punctate-verruculose; sterile cells up to 17 µm long ..... ***Mac. loudetiopsidis***
6. Sori on the stems, forming witches' brooms at the nodes ..... ***Mac. magicus***
– Sori elsewhere, not forming witches' brooms 7
7. Sori comprise the whole inflorescence ..... ***Spor. loudetiae-pedicellatae***
– Sori do not comprise the whole inflorescence 8
8. Sori comprise the central part of the spikelets, tubular, filiform, later as twisted or looped, 4–6 cm long bands; sterile cells up to 13 µm long .... ***Mac. loudetiae***
– Sori in the ovaries or florets, not as above 9
9. Sterile cells present, up to 26–30 µm long; columella, spore balls absent 10
– Sterile cells absent; columella and spore balls, though sometimes evanescent, present 11
10. Spores 5–9 µm long; wall of sterile cells 4–7 µm thick ..... ***Mac. zonotriches***
– Spores 7–10.5 µm long; wall of sterile cells 1–3 µm thick ..... ***Mac. nodiglumis***

Fig. 35. Spore balls, spores and sterile cells of *Urocystis pulsatillae-albae* on *Pulsatilla alba* in LM (type). Figs. 36–37. Spore balls and spores of *Sporisorium schizachyrii-sanguinei* on *Schizachyrium sanguineum* in LM and in SEM (type). Figs. 38–39. Spores of *Macalpinomyces loudetiopsidis* on *Loudetiopsis chrysothrix* in LM and in SEM (type). Bars = 10 µm.


35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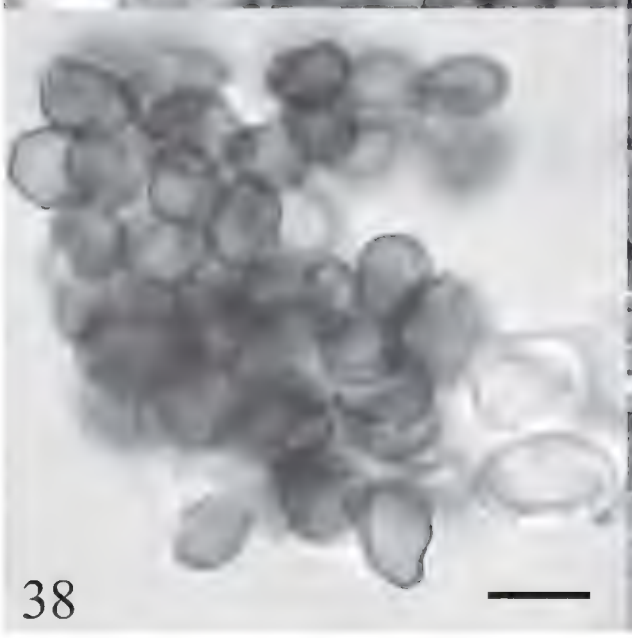
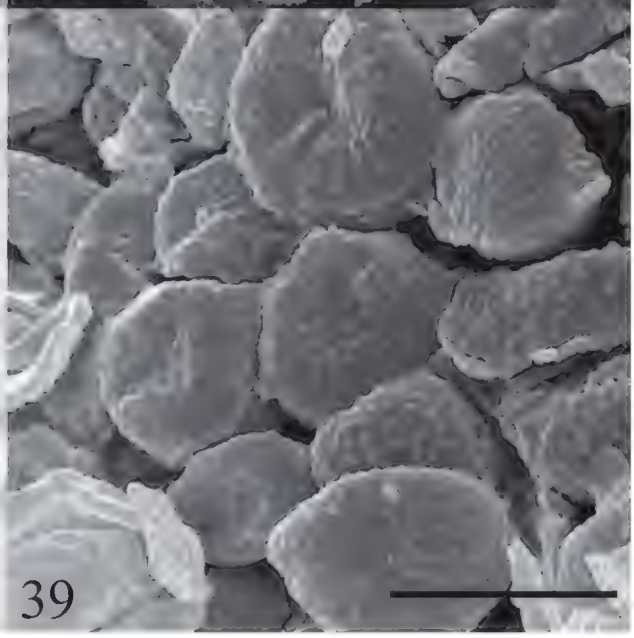

38


39

11. Columellae more than 8; spore balls evanescent; spores all alike, 6–11 µm long ..... ***Spor. catinatum***
– Columellae less than 5; spore balls more or less permanent; spores more or less dimorphic, larger 12
12. Spores 11–22 µm long ..... ***Spor. loudetiae-superbae***
– Spores smaller 13
13. Spores 12–17 µm long; contact wall of the outer spores thicker (ca 1.5 µm) than the free wall (ca 1 µm) ..... ***Spor. tristachydis***
– Spores smaller; free wall of the outer spores thicker than or equalling the thickness of the contact walls 14
14. Columellae 1–3; spore balls 25–65 µm long ..... ***Spor. decorsei***
– Columellae 3–5; spore balls larger 15
15. Spore balls 35–90 µm long; free surface of the spores finely verruculose, spore profile nearly smooth ..... ***Spor. tristachyae-hispidae***
– Spore balls 40–110(–140) µm long; free surface of the spores verrucose-echinulate, spore profile densely serrulate ..... ***Spor. tristachyae-nodiglumis***

What is "*Tolyposporium setariicolum* Syd."?

Sydow & Sydow (1912: 77) published a new smut fungus on *Setaria aurea* from Cameroon, *Tolyposporium setariicola*, giving for it a short description (see below, translated from German). The type in Berlin (B) was lost during World War II. No isotypes could be detected in B, BPI or S.

As species of *Tolyposporium* are restricted to host plants in the *Cyperaceae* and *Juncaceae*, the correct place for this fungus, based on its description, should be in the genus *Sporisorium*. Because of the exisiting name *Sporisorium setariicola* (Bag & Agarwal 2001: 224, as '*setaricolum*'), the name *Tolyposporium setariicola* cannot be transferred into the genus *Sporisorium*. It is named:

Sporisorium sydowiorum Vánky, **nom. nov.**

MycoBank MB 514049

≡ *Tolyposporium setariicola* Syd. & P. Syd., Ann. Mycol. 10: 77, 1912 (as '*setariicolum*'; non *Sporisorium setariicola* (Thirum. & Safeeulla) Bag & D.K. Agarwal).

≡ *Tolyposporidium setariicola* (Syd. & P. Syd.) Thirum. & Neerg., Friesia 11: 182, 1978 ('1977'; as '*setariicolum*').

Type on *Setaria aurea* (= *S. sphacelata* var. *aurea*), Cameroon, Sidderiberg, 30.VII.1909, C. Ledermann 4803. Type where(?), not in B (E. Gerhard, pers. comm.).

Etymology: This species is named in honour of the German Paul Sydow (1851–1925), and his son Hans Sydow (1879–1946), two of the "giants of mycology" of the 19th and 20th Centuries, the describers of this smut.

Sori destroying all spikelets of an inflorescence, dark, not swollen. Spore balls globose, ellipsoidal or irregular, 35–70 µm in diam., semipermanent, composed of numerous spores. Spores subpolyhedrally globose to ellipsoidal, 6–9 × 7–10 µm, brown, covered by easily detaching warts.

On *Poaceae: Setaria sphacelata* var. *aurea* (A. Br.) Clayton (*S. aurea* A. Br.); C. Africa (Cameroon). Known only from the type description.

Type not seen, description taken from the original. *Sporisorium sydowiorum* is close to *S. setariicola*, in which the spores, according to the original description, are 8.5–13.5 µm in diameter and verruculose. The easily detaching warts, covering the spores of *Tolyposporium setariicola* (= *Sporisorium sydowiorum*), are an unusual phenomenon within the species of the *Sporisorium/Ustilago* complex, but it is present in a few species of other smut fungus genera, e.g. in *Anthracoidea* and *Exoteliospora*.

Four further *Sporisorium* species are known on *Setaria:* 1. *S. kenyanum* Piątek 2006 (type on *Se. pumila* (Poir.) Roem. & Schult., Kenya), 2. *S. magnusianum* (A.A. Fisch. Waldh.) Vánky 2007 (type on *Se. geniculata* (Lam.) P. Beauv., locality unknown), 3. *S. setariae* (McAlpine) Vánky & R.G. Shivas 2003 (type on *Se. pumila,* Australia), and 4. *S. setariae-mombassanae* (L. Ling) Vánky 2007 (type on *Se. mombassana* R.A.W. Herrm.; = *S. incrassata* (Hochst.) Hack., Malawi). *S. sydowiorum* differs from all these species, as shown in the key below.

Key to the species of *Sporisorium* on *Setaria*

1. Sori in distal part of sterile shoots and leaves, long, twisted ..... ***S. kenyanum***
– Sori in ovaries or spikelets, short, not twisted 2
2. Columellae several; spores dimorphic ..... ***S. setariae***
– Columella one or absent; spores not dimorphic 3
3. Sori in some ovaries or spikelets of an inflorescence .. ***S. setariae-mombassanae***
– Sori in all ovaries or spikelets of an inflorescence 4
4. Spores in semipermanent balls, with easily detaching warts .... ***S. sydowiorum***
– Spores single or in loose balls, punctuate-verruculose to echinulate ..... ***S. magnusianum***

New combinations

Ustilago solida has characters of the genus *Tolyposporium*

Berkeley (in Hooker 1860: 270) described *Ustilago solida* Berk. 1860 on '*Chaetophora*' (= *Chaetospora*) *imberbis* (= *Schoenus apogon*), a *Cyperaceae* from Tasmania. The fungus was repeatedly transferred into various genera, e.g. *Urocystis, Sorosporium, Cintractia.* While members of the genus *Ustilago* are restricted to the *Poaceae,* species of *Sorosporium* (= *Thecaphora*) parasitise dicotyledonous plants only. The genus *Urocystis* is characterised by permanent spore balls composed of spores surrounded by sterile cells. Species of *Cintractia* are parasites of several genera in the *Cyperaceae,* but have single spores, not in balls. Therefore, for this fungus the following name is proposed:

Tolyposporium solidum (Berk.) Vánky, **comb. nov.**

MycoBank MB 512444

Basionym: *Ustilago solida* Berk., in Hooker, Flora Tasmaniae 2: 270, 1860.

≡ *Urocystis solida* (Berk.) A.A. Fisch. Waldh., Aperçu Syst. Ustil.: 38, 1877.

≡ *Sorosporium solidum* (Berk.) McAlpine, Smuts of Australia: 185, 1910.

≡ *Cintractia solida* (Berk.) Piepenbr., Nova Hedwigia 70: 310, 2000.

Type on *Chaetospora* (as '*Chaetophora*') *imberbis* (= *Schoenus apogon*), Australia, Tasmania, Penquite, XII.1845, R.C. Gunn, isotype DAR 59818 (a microscope slide).

Sori in all flowers of an inflorescence, comprising the innermost floral organs, visible between the glumes as black, globose to ovoid bodies, 1–2 mm in diam., exceptionally also on the stems, then fusiform, at first covered by a thick, brown peridium that early flakes away exposing the compact mass of spore balls and spores, powdery on the surface. Spore balls usually irregular or globoid to ellipsoidal, composed of 2–15 spores, loose but rather permanent, 20–40 × 25–55(–70) µm, reddish brown, developed in a hyaline matrix, in pockets of a sterile stroma. Spores subglobose, ovoid, elongate or irregular, flattened on one or two sides, 12–16 × 15–20 µm, yellowish to pale reddish brown; wall uneven, 0.5–1.5 µm thick, smooth to rough, in SEM finely, densely, irregularly verruculose and covered by remnants of the sporogenous hyphae. Spore germination unknown.

On *Cyperaceae: Schoenus apogon* Roem. & Schult. (*S. brownii* Hook. f.; *Chaetospora imberbis* R. Br.; *S. imberbis* R. Br.), *S. calyptratus* Kük., *S. carsei* Cheeseman, *S. cruentus*, *S. latelaminatus* Kük., *S. maschalinus* Roem. & Schult. (*S. axillaris* (R. Br.) Poir.), *S. nanus* (Lehm.) Benth., *S. nitens* var. *concinnus* (Hook. f.) Cheeseman (*S. concinnus* (Hook. f.) Hook. f.), *S. pauciflorus* (Hook. f.) Hook. f., *S. tesquorum* J.M. Black, *Schoenus* sp.; Australia, New Zealand.

Doassansia downingiae is a *Heterodoassansia*

The genus *Heterodoassansia* is characterised by a sterile cortex of the spore balls that is composed of two layers, an external one of small, smooth cells and an internal layer of larger, empty cells with ornamented inner surface (comp. Vánky 2002: 76–77).

Heterodoassansia downingiae (Liro) Vánky, **comb. nov.**

MycoBank MB 513231

Basionym: *Doassansia downingiae* Liro, Mycotheca fennica. Die Etiketten. No. 301–600: 114, 1939.

Type on *Downingia elegans*, USA, Idaho, Palouse Co., Lake Coeur d'Alene, VI–VII.1892, Aiton. (Type not in BPI, H, HPP, S).

Sori in leaves as minute, amphigenous, indistinct, violet-brown spots, or in stems as up to several cm long swellings with numerous spore balls embedded in the host tissue. Spore balls varying in shape and size, irregularly spherical to cylindrical, 75–150 × 75–200 µm, brown, composed of a central mass of

spores surrounded by a cortex of sterile cells. Spores globoid to polyhedral, 7–10 × 10–14 µm; wall even, c. 1 µm thick, smooth. Cortical sterile cells varying in shape and size, irregularly spherical, obovate or polyhedral, often only 3–5 µm but sometimes up to 8 × 10 µm in length, yellowish brown; wall up to 2.5 µm thick, minutely, densely punctuate-echinulate.

On *Campanulaceae: Downingia elegans* (Doug.) Torr. (*Bolelia elegans* (Doug.) Greene); N. America. Known only from the type locality.

Material not seen. Description taken from the original and Zundel (1953: 226).

Ustilago moelleri is a *Microbotryum*

Microbotryum moelleri (Bref.) Vánky, **comb. nov.**

MycoBank MB 513232

Basionym: *Ustilago moelleri* Bref., Unters. Gesammtgeb. Mykol. 12: 132, 1895 (as '*Mölleri*'; on p. 229, Pl. VIII, fig. 4 legend, '*Ustilago Polygoni hispidi*' is a slip of the pen).

≡ *Sphacelotheca moelleri* (Bref.) Liro, Ann. Acad. Sci. Fenn., Ser. A, 17(1): 158, 1924.

Type on *Polygonum hispidum,* Brazil, near Blumenau, 1893, leg. Möller; isotype H!

Sori in fruits, swollen to twice the size of the healthy ones (c. 8–9 mm long), filled with a dark purplish brown, semi-agglutinated to powdery mass of spores. Spores solitary, globose, subglobose, broadly ellipsoidal, slightly flattened, rarely irregular, 9–13.5 × 10–15 µm, pale yellowish brown with a purplish violet tint; wall evenly 0.8–2.5(–3) µm thick, densely verruculose, spore profile finely serrulate, in SEM small, rounded, often slightly elongated warts, with rounded or subacute tip, solitary, or two to several fusing into short rows or irregular groups; disjunctors absent. Spores developing in irregular groups within the hyaline mass of sporogenous hyphae, not catenate. Spore germination (Brefeld, 1895, Pl. VIII, fig. 4) without resting period, results in 4-celled basidia, developing broadly ellipsoidal, sessile, conjugating basidiospores, in nutrient media giving rise to yeast colonies.

On *Polygonaceae: Polygonum* (sect. *Persicaria*), *P. hispidum* Kunth; S. America. Known only from the type collection.

Seemingly, morphology of the sori and spores of *Microbotryum moelleri* is close to that of *Sphacelotheca hydropiperis*. Liro (1924: 158) studied the type of *Ustilago moelleri,* transferred it into the genus *Sphacelotheca,* and wrote: "Bezüglich des Baues des Sporenbehälters und des Sporenbildes stimmt *Sph. Mölleri* weitgehend mit *Sph. hydropiperis* überein". (Regarding the structure of the sori and the picture of the spores, *Sph. Mölleri* correspond mainly with *Sph. hydropiperis*). Vánky & Oberwinkler (1994: 26) even considered these two smuts synonyms. However, the spore building of *M. moelleri* differentiates it from *Sphacelotheca,* where the spores develop from hyphae at the base of the sorus, initially catenate, connected by disjunctors, later solitary. The disjunctors,

thickened parts of the exospore on two opposite, usually slightly flattened sides of the spores, are unique and typical for *Sphacelotheca,* but are missing in *M. moelleri.*

Excluded species

***Entyloma cyperi* is a species of *Physoderma* (*Chytridiomycetes*)**

Ahmad (1961: 120) described *Entyloma cyperi* S. Ahmad on the leaves of *Cyperus rotundus* L. from Pakistan, Karachi, 19.V.1956, S. Ahmad 14111.

Sori on leaves forming blackish, epiphyllous, linear or oblong spots, 2–5 mm long or by confluence covering a larger part of the leaf. Spores embedded in the host tissue, solitary, in irregular groups or in chains, globose, broadly ellipsoidal or with slightly flattened sides, 24–33 µm long, yellowish brown; wall evenly 1–1.5 µm thick, smooth, content homogeneous.

I did not see the type, but by courtesy of Sultan Ahmad (LAH, Lahore), I obtained a specimen, collected by him on the same host plant, in Pakistan, at Zafarwal, on 20.XII.1966 (HUV 17475). Study of this specimen revealed that it is identical with the description of the type, and that it is not a smut fungus but a species of *Physoderma, Physodermataceae.*

***Ustilago dactylicola* is not a smut fungus**

Spegazzini (1915: 118) described *Ustilago? dactylicola* Speg. in the fruits of dates (*Phoenix dactylifera* L., *Arecaceae*), from Senegal, Dakar, 19.VI.1913, LPS 3209!, giving a very short description. Sori in the pulp of mature fruits, labyrinthiform, spore mass dark olivaceous, compact. Spores agglutinated, 10–12 µm in diam., thin-walled. Present are with the normal spores also small, smooth spores of 2 µm diam.

Only spores of *Aspergillus* and chlamydospores are present in the specimen, badly damaged by insects. It is certainly not a smut fungus (Excluded here).

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